

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A throttle system, having

a throttle body, wherein a through hole is formed to receive one end of the shaft of a throttle valve to be inserted there-through, a bearing recession, with a diameter larger than the through hole, for installing a bearing that supports the shaft, to allow the shaft to rotate, is formed outside the through hole, and an enlarged recession, that is larger than the through hole, is formed between the through hole and bearing recession;

a bearing that is installed in the recession so as to support the shaft to allow the shaft to rotate; and

a seal structure, which is provided at an area including the through hole or an area including the boundary between the enlarged recession and the through hole,

wherein said seal structure forms a doughnut shape having the through hole therein of which a diameter is equal to or larger than, but nearly equal to, a diameter of said shaft of said throttle valve to prevent air leakage between an upstream and a downstream side of said throttle valve.

2. (Previously Presented) A throttle system according to Claim 1, wherein the enlarged recession is smaller in diameter than the bearing recession and a

combination of the bearing recession and enlarged recession forms a stepped recession.

3. (Previously Presented) A throttle system according to Claim 1, wherein the seal structure is constructed of seal material made of fluorocarbon resin, polyether etherketone resin, polyimide resin, polyamide resin, or polyphenylene sulfide resin.

4. (Currently Amended) A throttle system ~~according to Claim 1, having~~
a throttle body, wherein a through hole is formed to receive one end of the shaft of a throttle valve to be inserted there-through, a bearing recession, with a diameter larger than the through hole, for installing a bearing that supports the shaft, to allow the shaft to rotate, is formed outside the through hole, and an enlarged recession, that is larger than the through hole, is formed between the through hole and bearing recession;

a bearing that is installed in the recession so as to support the shaft to allow the shaft to rotate; and

a seal structure, which is provided at an area including the through hole or an area including the boundary between the enlarged recession and the through hole,
wherein the seal structure is so constructed that the area of a cross section in the enlarged recession, which, including the axis of the shaft, is parallel to the axis, is equal to or smaller than the area of a cross section in the gap between the circumferential surface of the shaft and inner wall of the through hole which crosses the axis of the shaft.

5. (Currently Amended) A throttle system, which is provided with a throttle body, comprising:

a shaft that crosses a suction passage of the throttle body and supports a throttle valve midway in the suction passage; and

bearings that support the shaft to allow the shaft to rotate axially,

wherein a through hole is provided in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve through rotation of said shaft; and

wherein seal material is provided between the suction passage side of a bearing and a suction passage side opening of the through hole, so that a contact surface between the seal material and a stepped recession side opening of the through hole and the contact surface between the seal material and a shaft surface are sealed, and said seal material forms a doughnut shape having the through hole therein of which a diameter is equal to or larger than but nearly equal to a diameter of said shaft of said throttle valve to prevent air leakage between an upstream and a downstream side of said throttle valve.

6. (Currently Amended) A throttle system, which is provided with a throttle body, comprising:

a shaft that crosses a suction passage of the throttle body and supports a throttle valve midway in the suction passage; and

bearings that support the shaft to allow the shaft to rotate axially[;].

wherein a through hole is provided in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve through rotation of said ~~shaft~~, and shaft,

wherein seal material is provided between the suction passage side of a bearing and a suction passage side opening of the through hole, so that a contact surface between the seal material and the inside circumference of the stepped recession or through hole and the contact surface between the seal material and a shaft surface are sealed, and said seal material forms a doughnut shape having the through hole therein of which a diameter is equal to or larger than but nearly equal to a diameter of said shaft of said throttle valve to prevent air leakage between an upstream and a downstream side of said throttle valve.

7. (Previously Presented) A throttle system, which is provided with a throttle body, comprising: a shaft that crosses a suction passage of the throttle body and supports a throttle valve midway in the suction passage; bearings that support the shaft to allow the shaft to rotate axially; and seal material provided between the suction passage side of a bearing and a suction passage side opening of the though hole;

wherein through holes are provided in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve,

wherein the shaft has a stepped shape having a larger diameter on the suction passage side and a smaller diameter on the throttle body outward side, and a contact surface between the seal material and a side surface of the stepped shape of the shaft and the contact surface between the seal material and the inside circumference of the stepped recession or the inside circumference of the through hole are sealed.

8. (Currently Amended) ~~A throttle system according to any one of Claims 5, 6 and 7,~~ which is provided with a throttle body, comprising:

a shaft that crosses a suction passage of the throttle body and supports a throttle valve midway in the suction passage; and

bearings that support the shaft to allow the shaft to rotate axially,

wherein a through hole is provided in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve through rotation of said shaft,

wherein seal material is provided between the suction passage side of a bearing and a suction passage side opening of the through hole, so that a contact surface between the seal material and a stepped recession side opening of the through hole and the contact surface between the seal material and a shaft surface are sealed,

wherein the bearing is an anti-friction roller having inner and outer rings, the diameter of the seal material is equal to or smaller than that of the anti-friction

bearing outer ring, and there is provided a stepped recession in the seal material, in which the diameter of one recession is equal to or larger than that of the anti-friction roller inner ring and smaller than that of the outer ring, and the diameter of the other recession is equal to or larger than that of the shaft and equal to or smaller than that of the through hole.

9. (Previously Presented) A throttle system, which is provided with a throttle body, comprising: a shaft that crosses a suction passage of the throttle body and supports a throttle valve midway in the suction passage; and bearings that support the shaft to allow the shaft to rotate axially

wherein through holes are supported in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve through rotation of said shaft; and

wherein a gap formed by the stepped recession, the shaft and a bearing of the throttle body, or a gap between the through hole and the shaft, is filled with adaptive material having a high adaptivity and lubricity in the course between the suction passage side of the bearing and the suction passage side opening of the through hole.

10. (Previously Presented) A throttle system, which is provided with a throttle body, comprising: a shaft that crosses a suction passage of the throttle body

and supports a throttle valve midway in the suction passage; bearings that support the shaft to allow the shaft to rotate axially; and a seal mechanism;

wherein through holes are provided in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve through rotation of said shaft; and

wherein the seal mechanism is so provided that the circumferential cross-sectional area in a gap formed by the shaft, a bearing and the stepped recession is equal to or smaller than the axial cross-sectional area in a gap between the shaft and the through hole.

11. (New) A throttle system according to Claim 1, wherein said bearing is an anti-friction bearing.

12. (New) A throttle system according to Claim 1, wherein said doughnut shape seal structure contacts said shaft.

13. (New) A throttle system according to Claim 1, wherein said doughnut shape seal structure does not contact said shaft.

14. (New) A throttle system according to Claim 5, wherein said doughnut shape seal material contacts said shaft.

15. (New) A throttle system according to Claim 5, wherein said doughnut shape seal material does not contact said shaft.

16. (New) A throttle system according to Claim 6, wherein said doughnut shape seal material contacts said shaft.

17. (New) A throttle system according to Claim 6, wherein said doughnut shape seal material does not contact said shaft.

18. (New) A throttle system , which is provided with a throttle body, comprising:

a shaft that crosses a suction passage of the throttle body and supports a throttle valve midway in the suction passage; and

bearings that support the shaft to allow the shaft to rotate axially,

wherein a through hole is provided in the throttle body, through which the shaft is inserted so as to extend across the suction passage, and stepped recessions are provided in the throttle body for installing the bearings, whereby the suction air flow in the suction passage is controlled by operating the throttle valve through rotation of said shaft,

wherein seal material is provided between the suction passage side of a bearing and a suction passage side opening of the through hole, so that a contact surface between the seal material and a stepped recession side opening of the through hole and the contact surface between the seal material and a shaft surface are sealed, and

wherein the bearing is an anti-friction roller having inner and outer rings, the diameter of the seal material is equal to or smaller than that of the anti-friction bearing outer ring, and there is provided a stepped recession in the seal material, in which the diameter of one recession is equal to or larger than that of the anti-friction roller inner ring and smaller than that of the outer ring, and the diameter of the other recession is equal to or larger than that of the shaft and equal to or smaller than that of the through hole.

19. (New) A throttle system according to Claim 7, wherein the bearing is an anti-friction roller having inner and outer rings, the diameter of the seal material is equal to or smaller than that of the anti-friction bearing outer ring, and there is provided a stepped recession in the seal material, in which the diameter of one recession is equal to or larger than that of the anti-friction roller inner ring and smaller than that of the outer ring, and the diameter of the other recession is equal to or larger than that of the shaft and equal to or smaller than that of the through hole.